

# The collaboration between *Int J Life Cycle Assess* and *J LCA Jpn*

Abstracts of research articles published in *The Journal of Life Cycle Assessment, Japan* (*J LCA Jpn*), vol. 5, no. 2, 2009

Yasunari Matsuno • Yasushi Kondo

Received: 8 April 2010 / Accepted: 8 April 2010 / Published online: 28 April 2010  
© Springer-Verlag 2010

## 1 Preamble

The Institute of Life Cycle Assessment Japan (ILCAJ) was established in October 2004. The goal of ILCAJ is to promote academic activities related to life cycle thinking and to share expert knowledge with colleagues from wide-ranging backgrounds. Professor Ryoichi Yamamoto, University of Tokyo, has taken the responsibility as Chairman of the ILCAJ.

In April 2005, ILCAJ has successfully established its publication organ (in Japanese), *The Journal of Life Cycle Assessment Japan* (*J LCA Jpn*). The issues appear every 3 months. *J LCA Jpn* publishes peer-reviewed research articles, commentaries and discussions, (technical) reports, lecture notes, and presentations of research groups in Japan, along with others. In *Int J Life Cycle Assess* 12(6):348–350, we were happy to announce the collaboration with *J LCA Jpn* for the purpose of exchanging knowledge, new insights, experiences, and information across the different languages.

*The corner J LCA Jpn* aims to be a bridge between the LCA community of Japan and that of the whole world. All

abstracts of research articles published in *J LCA Jpn*, as well as commentaries and discussions, will appear in *Int J Life Cycle Assess*, Corner: JLCA Jpn, in order to introduce Japanese activities to our readers. In addition, some selected research papers from *J LCA Jpn* will be submitted to *Int J Life Cycle Assess* for publication following peer review. We hope that this collaboration will stimulate the global exchange of information through professional pathways. The following abstracts were published in *J LCA Jpn* vol. 5, no. 2.

Professor Hiroshi Mizutani, Nihon University, has become the Editor-in-Chief of *J LCA Jpn* since January 2009.

## 2 Research articles

2.1 Methodology for disclosure of environmental information considering uncertainty in LCA of transport systems: proposal for “an eco-report for transport systems”

Naoki Shibahara<sup>1</sup> • Yukiko Watanabe<sup>2</sup> • Ryoko Morimoto<sup>1</sup> • Hirokazu Kato<sup>1</sup>

<sup>1</sup>Graduate School of Environmental Studies, Nagoya University, C1-2 (651), Furo-cho, Chikusa-ku, Nagoya, Aichi, 464-8603 Japan

<sup>2</sup>Nippon Telegraph and Telephone East Corporation, 3-19-2 Nishishinjuku, Shinjuku-ku, Tokyo, 169-8019 Japan

*Objective* “Uncertainty” generally exists when applying LCA to environmental load analysis of transport systems. Hence, there is a need for a systematic way of presenting the results by clarifying such uncertainties and avoiding any

Responsible editors: Yasunari Matsuno and Yasushi Kondo

Y. Matsuno (✉)

Department of Materials Engineering,  
Graduate School of Engineering, University of Tokyo,  
7-3-1 Hongo,  
Bunkyo 113-8656 Tokyo, Japan  
e-mail: matsuno@material.t.u-tokyo.ac.jp

Y. Kondo

Faculty of Political Science and Economics, Waseda University,  
1-6-1 Nishi-waseda,  
Shinjuku 169-8050 Tokyo, Japan  
e-mail: ykondo@waseda.jp

misleading interpretations. This paper provides a method that shows analytical results with their associated uncertainties.

**Results and discussion** This paper considers inventory analysis for an LRT system and investigates uncertainties in each stage. The uncertainties are organized into the following three groups: (1) Errors associated with emission factors, (2) errors from assumptions, and (3) errors from ripple effects. In discussing how to cope with these uncertainties, two important parameters affect results. One is the variance in embodied emission factors used for computation; the variance range for nine types of factors is analyzed. Another is a parameter related to assumptions and limitations of data and calculation (e.g., lifetime, transport demand, and congestion rate). Sensitivity analysis is utilized for representing uncertain factors and exploring methods of presenting eco-efficiency information. The total distance traveled, number of passengers, and travel speed serve as indicators of transport system performance. In this way, transport plans are not developed by simply evaluating the environmental aspects; different levels of demand are also considered to allow decision makers to determine an appropriate transport system. Consequently, a Type III environmental label is proposed to make environmental information available for public inspection.

**Conclusions** This paper proposes an “Eco-Report” for transport systems, which specifically includes life cycle environmental load, sensitivity analysis, eco-efficiency, and other issues that require attention. This report represents the results of LCA together with the associated uncertainties; it will help policy makers understand environmental information.

## 2.2 The recalculation and evaluation of CO<sub>2</sub> basic unit of 2MW domestic wind turbine: a case study in the Choshi area, Chiba Prefecture, Japan

Takao Ando<sup>1</sup> • Hiroshi Nagai<sup>2</sup> • Norio Kubo<sup>3</sup> • Atsutoshi Muto<sup>3</sup> • Kensuke Kobayashi<sup>4</sup> • Kiyotaka Tahara<sup>4</sup> • Atsushi Inaba<sup>4</sup>

<sup>1</sup>Chiba Institute of Science, 3 Shiomi-cho, Choshi, Chiba, 288-0025 Japan

<sup>2</sup>Nihon University, 1-2-1 Izumi-cho, Narashino, Chiba, 275-8575 Japan

<sup>3</sup>The Japan Steel Works, LTD, 4 Chatsu-machi, Muroran, Hokkaido, 051-8505

<sup>4</sup>National Institute of Advanced Industrial Science and Technology (AIST), 16-1 Onogawa, Tsukuba, Ibaraki, 305-8569 Japan

**Objective** Many wind turbines have been constructed in the Choshi area, Chiba prefecture, Japan, as the Choshi area is rich in good wind supply for wind power generation. Wind turbines generate sustainable energy; however, CO<sub>2</sub> is emitted during the various processes in the life cycle of a wind turbine. Therefore, it is important to estimate the environmental impact in the megawatt-scale wind turbines by the method of LCA using the latest data of the environmental impact.

**Method** The functional unit is selected as 1-kWh electricity delivered to consumers. In this study, the lifetime of turbines is set to 20 years and the life cycle includes manufacturing, construction, transportation and operation and maintenance processes. The investigated turbine is a J82-2MW manufactured by Japan Steel Works (JSW), Ltd., in Muroran factory, Hokkaido, Japan.

**Results and discussion** The LCA result shows that 1-kWh electricity generated by a domestic turbine, under the condition of average wind speed equal to 6m/s, the CO<sub>2</sub> emission from operation and maintenance processes which are calculated at the rate of 0.5%/year to 2.0%/year of total emission of CO<sub>2</sub> from manufacturing and transportation processes and the losses of transmission grid set to 5 and 10%, has impact ranging from 10.1 to 12.9 g-CO<sub>2</sub> in its life cycle. When the result is compared to the amount of CO<sub>2</sub> emission of 29.5 g/kWh by 300 kW turbine, it is clear that the environmental burdens of MW wind turbine are significantly lower.

**Conclusions** The recalculation result of the domestic 2MW wind turbine constructed in the Choshi area shows 10.8 g-CO<sub>2</sub>/kWh under the following conditions: the average wind speed is equal to 6 m/s, the CO<sub>2</sub> emission from operation and maintenance process are calculated at the rate of 1.0%/year of total emission of CO<sub>2</sub> from manufacturing and transportation processes and the loss of transmission grid is set to 5% in its life cycle. The important points of electricity produced by wind turbines are finding locations with good wind supply and application of large-scale wind turbines. And the “product category rule” should be established for the standardized calculation of the Japanese CO<sub>2</sub> basic unit (g-CO<sub>2</sub>/kWh) of the wind generator.

## 2.3 Toward renovation of eco mark: value creation of eco mark through structured marketing concept

Miho Ohshima

Japan Environment Association Eco Mark Office, 1-4-16 Nihonbashi Bakurocho, Chuo-ku, Tokyo, 103-0002 Japan

Eco Mark is at the turning point of playing the role of “leading eco-conscience action”, the major objective of the program, which needs the restructuring of its brand. In the process of the analysis using the basic marketing framework “4P” and “4C”, problems of the program were picked up, then relation among the problems from the procurement motive aspect and players of the problem solving in life cycle process was clarified, and finally, the necessity of co-action of each player was given. Given in the main subject are the problems which Eco Mark program has today. However, the development of the action coordinating the “Mid-term Action Plan of Eco Mark” which is already being released and the main subject is being left as a future assignment. On the other hand, as one improvement, all kinds of information are now provided from the viewpoint of the receiver, not from the viewpoint of the sender as it used to be and, also, the recent action and status of Eco Mark business are reported to the public

**Keywords:** Eco-label, Marketing, Branding, Life-cycle process, Green procurement

#### 2.4 Analysis of environmental load related to household consumption considering climate change and household characteristics

Naoki Yoshikawa<sup>1</sup> • Koji Amano<sup>2</sup> • Koji Shimada<sup>3</sup>

<sup>1</sup>Graduate School of Science and Engineering, Ritsumeikan University, 1-1-1 Noji Higashi, Kusatsu, Shiga, 525-8577 Japan

<sup>2</sup>College of Science and Engineering, Ritsumeikan University, 1-1-1 Noji Higashi, Kusatsu, Shiga, 525-8577 Japan

<sup>3</sup>College of Economics, Ritsumeikan University, 1-1-1 Noji Higashi, Kusatsu, Shiga, 525-8577 Japan

**Objective** It is important to estimate future environmental load from household sector because CO<sub>2</sub> emission from the household sector in Japan is increasing, and reduction of waste generation is also urgently required. Besides, the environmental load would be influenced by some driving forces: changes in population composition, increase of solitary household, climate change, economic growth, progress of environmental technology, changing lifestyle, etc. In this study, we analyzed environmental load (CO<sub>2</sub>, final disposal) induced from household consumption considering household characteristics, temperature rise and income, and estimated future environmental load in future scenarios of those characteristics.

**Results and discussion** 4.6–28.4% increase in CO<sub>2</sub> emission and 8.9–40.8% increase in final disposal between 2000 and 2030 could be estimated in 24 scenarios; those are combinations of 4 economic scenarios based on scenarios in the IPCC SRES and 6 population and household scenarios. The difference of CO<sub>2</sub> emission estimation by population and household variations is about 9% in maximum. Changes of CO<sub>2</sub> emission between 2000 and 2030 caused by socio-economic situation changes indicate −12.8% population decline, +7.6% household characteristics changes, and +25.9% economic growth in the middle scenario. Temperature rise effect on CO<sub>2</sub> emission is negative, although it is not very significant.

**Conclusions** We estimated that future environmental loads induced by household consumption in Japan should increase and a certain amount of negative effect by population decline could be offset by household characteristic changes. The result suggests that it is important to consider not only population change but also consumption style change by demographic composition based on sustainable consumption.